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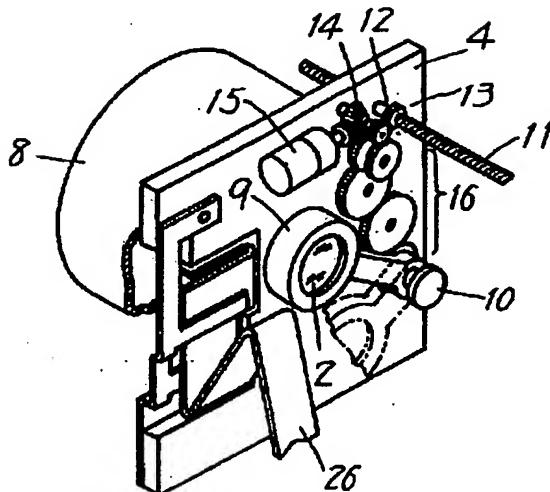
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(54)【発明の名称】 カメラの安全装置

(57)【要約】 (修正有)

【目的】裏蓋を開いたときには、フィルムアーチヤを通して侵入した異物によつてカメラの機能が阻害されることの無い安全装置を提供する。

【構成】モータ15の駆動によつて後群レンズ2を光軸に直角な方向に退避させる後群レンズ移動機構16と、モータの駆動を制御するモータ制御回路手段と、フィルムの巻戻し、フィルムの取出しまたはフィルム装填に先立つて変位する移動部材の変位を検知する検知手段とを設け、その検知手段の検出信号に後群レンズを撮影光路の退避位置へ自動的に退避させるように構成することを技術的要点とするものである。



## 【特許請求の範囲】

【請求項1】 前群レンズと後群レンズとの間にシャツタが設けられた撮影レンズを有するカメラにおいて、モータの駆動によつて前記後群レンズを撮影光路外の退避位置へ移動させる後群レンズ移動手段と、フィルムの巻戻し、フィルムの取出しまたはフィルムの装填のいずれかに先立つて起こる状態の変化を検知する検知手段と、該検知手段からの検知信号を受けて前記後群レンズを前記退避位置へ移動させるように前記モータの駆動を制御するモータ制御回路手段とを有することを特徴とするカメラの安全装置。

【請求項2】 前記撮影レンズは、それ自身撮影可能な前群の主レンズ(1)と、焦点距離を短焦点から長焦点に切り替える後群の副レンズ(2)とから成り、前記主レンズ(1)と副レンズ(2)とは前記モータによつて駆動され前記副レンズ(2)が退避位置まで移動したときに前記シャツタ(6)は前記主レンズ(1)と共に、カメラのフィルムアーチヤ(17)に近付く方向に繰り込まれることを特徴とする請求項1記載のカメラの安全装置。

【請求項3】 前記検知手段は、カメラの裏蓋(27)の開動作を検知するスイッチ(SW<sub>1</sub>)であることを特徴とする請求項1または請求項2記載のカメラの安全装置。

【請求項4】 前群レンズと後群レンズとの間にシャツタが設けられた撮影レンズを有するカメラにおいて、モータの駆動によつて前記後群レンズを撮影光路内の挿入位置から撮影光路外の退避位置へ移動させる後群レンズ移動手段と、前記後群レンズを前記退避位置に位置させるべく操作されると退避信号を、前記挿入位置に位置させるべく操作されると挿入信号をそれぞれ出力する操作手段と、全フィルムの撮影完了から裏蓋の開放までの間に起こる状態の変化を検知し、裏蓋開放信号を出力する検知手段と、

前記後群レンズが、前記退避位置にあると退避位置信号を、該退避位置にないと非退避位置信号を、前記挿入位置にあると挿入位置信号を、該挿入位置にないと非挿入位置信号をそれぞれ出力する位置検出手段と、

前記退避信号と裏蓋開放信号とのいずれか少なくとも一方と、前記非退避位置信号とを共に受けると、前記後群レンズを前記退避位置へ移動させるように前記モータの駆動を制御し、前記挿入信号と前記非挿入位置信号とを共に受け、かつ前記裏蓋開放信号を受けないと、前記後群レンズを前記挿入位置へ移動させるように前記モータの駆動を制御するモータ制御回路手段と、

前記退避信号と退避位置信号とを共に受けてからでないと、または前記挿入信号と挿入位置信号とを共に受けてからでないと、シャッターレリーズ操作を不可能とする手

段とを有することを特徴とするカメラの安全装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、カメラのフィルムアーチヤ部分から侵入する異物から暗箱内のレンズ等を保護する安全装置、特に、前群レンズと後群レンズとの間にシャツタが設けられた撮影レンズを有するカメラの安全装置に関する。

## 【0002】

【従来の技術】前群レンズと後群レンズとの間にシャツタが設けられた撮影レンズを有するカメラにおいては、従来前群レンズの前面はレンズパリア等によつて塵その他の異物から安全に保護されている。しかし、後群レンズの後面については従来何等の保護手段も設けられていないため、フィルム装填の際にカメラの裏蓋を開けると、カメラのフィルムアーチヤを通してレンズ後面が露出する。その為、フィルムアーチヤを通して塵、切屑その他フィルム断片等が侵入し、レンズ面に付着し、最悪の場合には、レンズを傷付ける恐れが有つた。

【0003】このことは、通常のピトワインシャツタを有する撮影レンズばかりでなく、ビハインドシャツタを有する撮影レンズにリヤコンバージョンレンズを付加した場合、或いは、主レンズをシャツタと共に繰り出してその後に副レンズを挿入するいわゆる二焦点式カメラにおいても同様で、従来、フィルムアーチヤ側からの内部装置の保護については何等の対策もなされていなかつた。

## 【0004】

【発明が解決しようとする課題】本発明は、上記従来のカメラにおける欠点を解決し、裏蓋を開いたときには、フィルムアーチヤを通して侵入した異物によつてカメラの機能が阻害されることの無い安全装置を提供することを目的とする。

## 【0005】

【課題を解決するための手段】上記の目的を達成するために本発明は、モータの駆動によつて後群レンズを光軸に直角な方向に退避させる後群レンズ移動機構と、モータの駆動を制御するモータ制御回路手段と、フィルムの巻戻し、フィルムの取出しまたはフィルム装填に先立つて変位する移動部材の変位を検知する検知手段とを設け、その検知手段の検出信号に後群レンズを撮影光路の退避位置へ自動的に退避させるように構成することを技術的要点とするものである。

## 【0006】

【実施例】次に、本発明の実施例を添付の図面に基づいて詳しく述べる。図1は本発明の実施例を示す二焦点カメラの一部上面を残して破断した断面図で、撮影レンズ鏡筒がカメラ本体から繰り出された望遠状態を示す。

図1において、撮影レンズは、単独にても撮影可能な前群の短焦点距離(以下「広角」と称する。)の主レンズ

1と、長焦点距離（以下「望遠」と称する。）に切り替える際に主レンズ1の光軸上に挿入される後群の副レンズ2とから成り、主レンズ1を保持する主レンズ枠3は台板4に固設されたシヤツタ基板5に取り付けられている。台板4とシヤツタ基板5との間には絞り兼用のシヤツタ6が設けられ、また、主レンズ1の前側には、レンズパリア装置7が設けられ、主レンズ枠3、シヤツタ基板5およびレンズパリア装置7の外周を覆つて撮影レンズ鏡筒8が台板4の前側に固設されている。

【0007】台板4の裏側には、副レンズ2を保持する副レンズ枠9が支軸10のまわりに回動可能に支持され、さらに図2に示すように、光軸方向に伸びた送りねじ軸11と螺合する送りナット12と一緒に歯車12を、ペベルギヤ14を介して回転させる駆動モータ15が固設され、駆動モータの回転により台板4が光軸に沿つて移動するよう構成されている。また、副レンズ枠9は、減速ギヤ列16を介して駆動モータ15によって駆動され、撮影レンズ鏡筒8が台板4と共に図1に示す望遠位置から図3に示す広角位置へ繰り込まれると、その副レンズ枠9は副レンズ2を主レンズ1の光軸に一致して置く図2中で実線にて示す挿入位置から破線にて示す撮影光路外の退避位置まで移動する如く構成されている。

【0008】フィルムアーチヤ17とフィルム供給室18およびフィルム巻取り室19を有するカメラ本体20の前面には、移動可能な台板4と撮影レンズ鏡筒8とを収容する突出壁21が設けられ、そのカメラ本体20と突出壁21とは、外装カバー22によつて覆われている。またその外装カバー22の上面には、図1に示す如く焦点距離切替え操作部材23とリリーズ釦24とが設けられている。カメラ本体20と台板4との間には、台板4に設けられた駆動モータ15やシヤツタ制御装置25等の電気装置と、これ等を制御するカメラ側の制御装置とを電気的に接続するためのフレキシブル回路板26が設けられている。さらにまた、カメラの裏蓋27の内側には、カメラ本体20側に設けられた裏蓋スイッチSW1を閉鎖させる突子28が設けられている。この裏蓋スイッチSW1は裏蓋27が閉位置に在るか開位置に在るかを検出するための検知手段を構成している。また、カメラ本体20のフィルムアーチヤ17の前側の周囲には突出壁29が設けられ、台板4は、広角位置においてその突出壁29の前端29aに接近する位置まで繰り込まれるように構成されている。これにより、台板4の裏面に設けられた副レンズ2、減速ギヤ列16、駆動モータ15等はフィルムアーチヤ17を通して見えないようになり、また、塵等が内部に侵入して副レンズ2を曇らせたり歯車列16との作動を害することが防止される。特に副レンズ2はフィルムアーチヤ17の前面から退避するので、フィルムアーチヤを通して侵入する異物等によつて傷付けられる恐れが無く安全に保護され

る。

【0009】また、前群の主レンズ1の後面はシヤツタ6によつて覆われているので塵や異物が付着する恐れが無く安全に保護される。図4は、図1に示す実施例カメラにおける駆動モータ15を制御する回路の概略を示す回路図である。このカメラにおいては、図1には図示されない被写体輝度検出装置40および自動距離検出装置50が設けられ、絞り兼用シヤツタ6を駆動制御するシヤツタ制御装置23と駆動モータ15の回転を制御するモータ制御回路60とは、その輝度検出装置40、自動距離検出装置50と共に、電源スイッチSW<sub>0</sub>の投入により動作を開始するマイクロプロセッサ(CPU)30の指令に従つて動作するよう構成されている。リリーズ釦24(図1参照)を半押下すると、リリーズスイッチSW<sub>1</sub>が閉じ、そのリリーズ情報がCPU30に入力される。これにより、CPU30は、自動距離検出装置を動作させて被写体までの距離を検出し、その検出信号に基づいて、モータ制御回路60を介して駆動モータを駆動させ、台板4を被写体距離に応じて移動させて距離調節を行う。また同時に被写体からの光を受光する輝度検出装置からの検出信号に基づいて適正な絞り値とシヤツタ速度値とを演算し、その演算結果をメモリーする。さらにリリーズ釦24が全押下されるとシヤツタ6はリリーズされ、シヤツタ制御装置23はCPU30にメモリーされた絞り値と速度値との組合せに従つてシヤツタ6を開閉させ、露光を終了する。露光を終了すると、CPU30は所定のシーケンスに従つてモータ制御回路60に信号を送り駆動モータ15を逆転させて台板4と共に撮影レンズ鏡筒8をリセット位置へ復帰させる。撮影レンズ鏡筒8がリセット位置に復帰すると、CPU30はリセット台板4に連動するリセットスイッチSW<sub>4</sub>からのリセット情報を入力して、駆動モータ15を停止させる。

【0010】一方、焦点距離切替え操作部材23(図1参照)を記号「T」から「W」に切り替えると、この焦点距離切替え操作部材23に連動するT/W切替えスイッチSW<sub>2</sub>からの切替え情報に基づいて、CPUは駆動モータ15を駆動させ、台板4と共に撮影レンズ鏡筒8は望遠位置から広角位置へ図3に示すように繰り込まれる。また同時に、副レンズ枠9は図1の挿入位置から、図3に示すように、フィルムアーチヤ17の前部に設けられた突出壁29より外側の退避位置へ移動し、撮影レンズは主レンズ1のみの短焦点レンズに切り替えられる。さらに、台板4が望遠位置から広角位置へ移動すると、台板4の動きに連動して撮影レンズ鏡筒8が望遠・広角いずれの位置に在るかを検出する図示されないエンコーダのようなレンズ位置検出装置のレンズ位置検出スイッチSW<sub>3</sub>からの位置情報がCPU30に入力される。

【0011】図5はCPU30におけるレンズ制御の流

れ線図である。CPU30は、裏蓋スイッチSW<sub>1</sub>、T/W切替えスイッチSW<sub>2</sub>またはレリーズスイッチSW<sub>3</sub>が切り替わる信号により動作を開始し、先ず、裏蓋27が閉じているか否かを判断(ステップ101)する。この判断は、裏蓋スイッチSW<sub>1</sub>からの裏蓋開閉情報に基づいて行われる。さらに、ステップ101がNOの場合、すなわち裏蓋27が開成状態にあるときは、台板4と共にレンズ位置が広角側リセット位置にあるか否かが判断(ステップ102)される。この場合レンズ位置情報は、台板4に連動するT/W位置検出スイッチSW<sub>4</sub>とりセットスイッチSW<sub>5</sub>からの情報に基づいて判断される。もし、レンズが広角側リセット位置に無い場合すなわちステップ102がNOのときは、レンズは台板4と共に繰り込まれ(ステップ103)、広角リセット位置に達すると、裏蓋27が閉じられるまで待機する(ステップ105)。また、ステップ102における判断がYESのとき、すなわちレンズが広角側セット位置にあるときも、裏蓋27が閉じられるまで待機する(ステップ104)。

【0012】ステップ101またはステップ104において裏蓋27が閉じられていると判断された場合すなわちYESのときは、焦点距離切替え操作部材23に連動するT/W切替えスイッチSW<sub>2</sub>からの情報により望遠(T)側が選択されているか否かが判断(ステップ105)される。もし、その判断がNOの場合すなわち広角(W)が選択されているときは、レンズ位置検出スイッチSW<sub>4</sub>からの情報により、実際にレンズが広角側リセット位置に在るか否かが判断(ステップ106)され、YESの場合すなわち広角側リセット位置にレンズが在るときはステップ110に移行し、望遠位置に在る場合にはレンズは繰り込まれ(ステップ107)、リセット位置に達するとステップ110に移行する。

【0013】一方、ステップ105における。判断がYESのとき、すなわちT/W切替え操作部材23が望遠位置(T)にセットされている場合には、レンズ位置検出スイッチSW<sub>4</sub>からの情報によりレンズが望遠側リセット位置に置かれているか否かが判断(ステップ108)され、もしNOのときはすなわちレンズが広角側リセット位置にあるときは、レンズが繰り出され(ステップ109)、望遠リセット位置に到達したとき、次のステップ110に移行する。

【0014】ステップ108において、YESの場合、すなわちレンズが望遠側リセット位置にあると判断されたならば、次にレリーズ釦24に連動するレリーズスイッチSW<sub>3</sub>がONされたか否かが判断(ステップ110)され、レリーズスイッチSW<sub>3</sub>がONとなると、CPU30は、自動距離検出装置50からの検出信号に基づいて自動焦点調節(ステップ111)の動作を行いさらに、被写体からの光を受光する輝度検出装置(40)からの検出信号に基づいて適正な絞り値とシャッタ速度

値とが演算して適正露出値を自動設定(ステップ112)し、引き続ぐシーケンスに従つて撮影(ステップ116)のために動作し、撮影が完了すると、その完了信号により動作をストップする。

【0015】上記の実施例においては、フィルム交換あるいはフィルム装填に先立つて開かれる裏蓋の動きを検知する裏蓋スイッチSW<sub>1</sub>からの情報に基づいて主レンズ1と副レンズ2とが移動するように構成されている。しかし、主レンズ1と副レンズ2との駆動は、裏蓋の開閉に直接連動するスイッチSW<sub>1</sub>からの情報ばかりでなく、例えば、巻戻し釦の押動やフィルム巻上げ終端におけるフィルムの張力変化を検知するスイッチのような、フィルムの巻戻しに先立つて変位する部材の動きを検知するスイッチ手段や、フィルムバトローネ軸と巻戻し軸との結合を解除する巻戻しノブの軸方向の摺動動作や裏蓋錠止装置の錠止解除動作のようなフィルムの取出し、装填に先立つて変位する部材に連動するスイッチを設け、そのスイッチからの信号により、副レンズを自動的に退避させると共に主レンズを沈胴位置まで縁込むよう構成してもよい。

【0016】また、上記の実施例においては、裏蓋の閉動作によつて、副レンズの自動退避が解除されるように構成されているが、裏蓋錠止装置の錠止動作、フィルムの空送りまたは空送り釦の押圧動作を検知するスイッチの検出信号等に応じて副レンズの自動退避が解除されるようにもよる。なお、上記の実施例は二焦点式カメラにおいて主レンズと共に副レンズが同一のモータによつて駆動されるように構成されているが前群レンズと後群レンズとの間にシャッタが設けられた撮影レンズを有するカメラにおいては後群のみを退避させるように構成すればよい。

【発明の効果】以上の如く本発明によれば、少なくとも裏蓋が開成されたときは、副レンズ(後群レンズ)がフィルムアーチャ前面から退避し、主レンズ(前群レンズ)の後面はシャッタによって覆われるので、フィルムアーチャを通して侵入する塵その他の異物から、撮影レンズを安全に保護することができる。さらに、実施例に示すように二焦点式カメラに組み込めば、後群レンズが退避すると同時に前群レンズと共にレンズ移動機構がフィルムアーチャの外側部に接近し、フィルムアーチャの前面がシャッタ部分によつて覆われるので、フィルムアーチャから侵入する塵や異物が直接レンズ移動機構に付着することが無い。従つてレンズ移動機構の作動が不円滑になつたり故障を起こす原因を除去することができる。

#### 【図面の簡単な説明】

【図1】本発明の実施例を示す二焦点式カメラの横断面図

【図2】図1の実施例におけるレンズ駆動機構部の斜視

7

8

図

【図3】図1の実施例カメラの裏蓋を開いたときの状態  
を示す断面図

【図4】図1の実施例カメラの制御回路図

【図5】図4中に設けられたマイクロプロセッサCPU  
の動作を示す流れ線図

【主要部分の符号の説明】

1—主レンズ(前群レンズ)

2—副レンズ(後群レンズ)

3—主レンズ枠

4—台板

6—シャツタ

8—撮影レンズ鏡筒

11~13—台板移動機構

15—モータ

16—減速ギヤ列(後群レンズ移動機構)

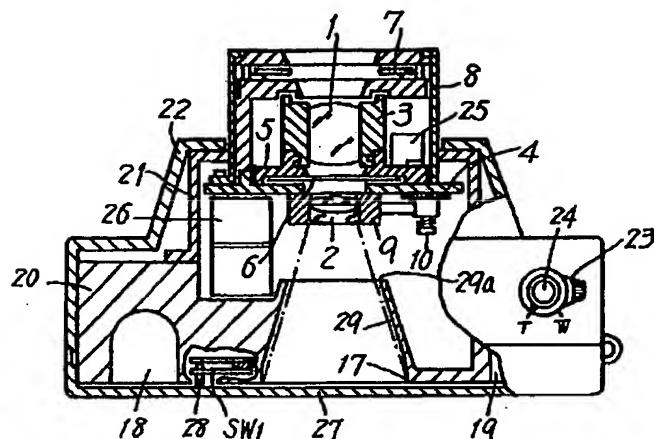
23—焦点距離切替え操作部材

27—裏蓋(変位部材)

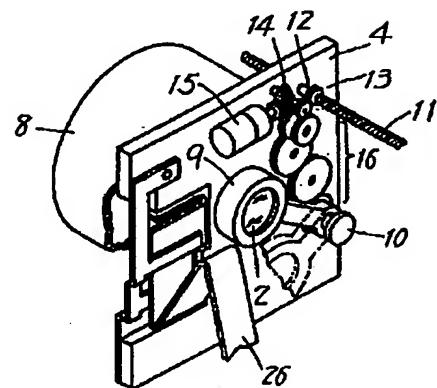
30, 60—モータ制御回路手段

10 SW<sub>1</sub>—裏蓋スイッチ(検知手段)

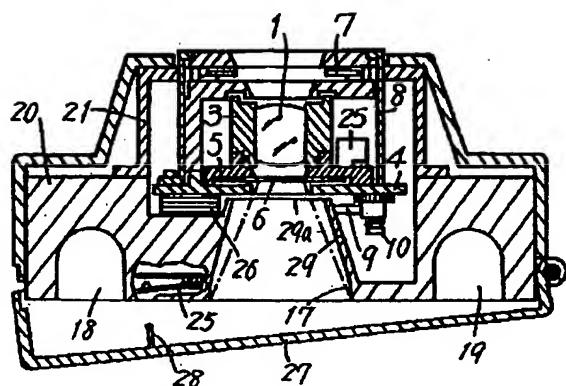
【図1】



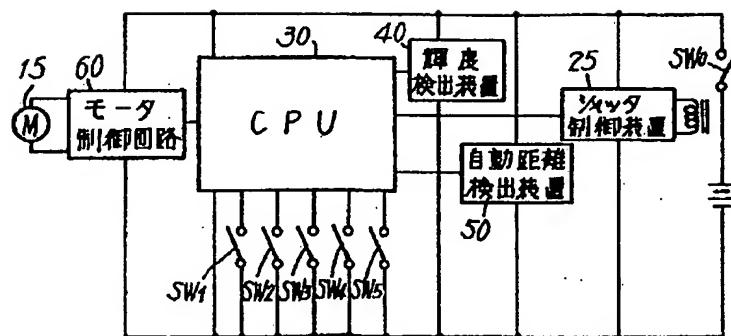
【図2】



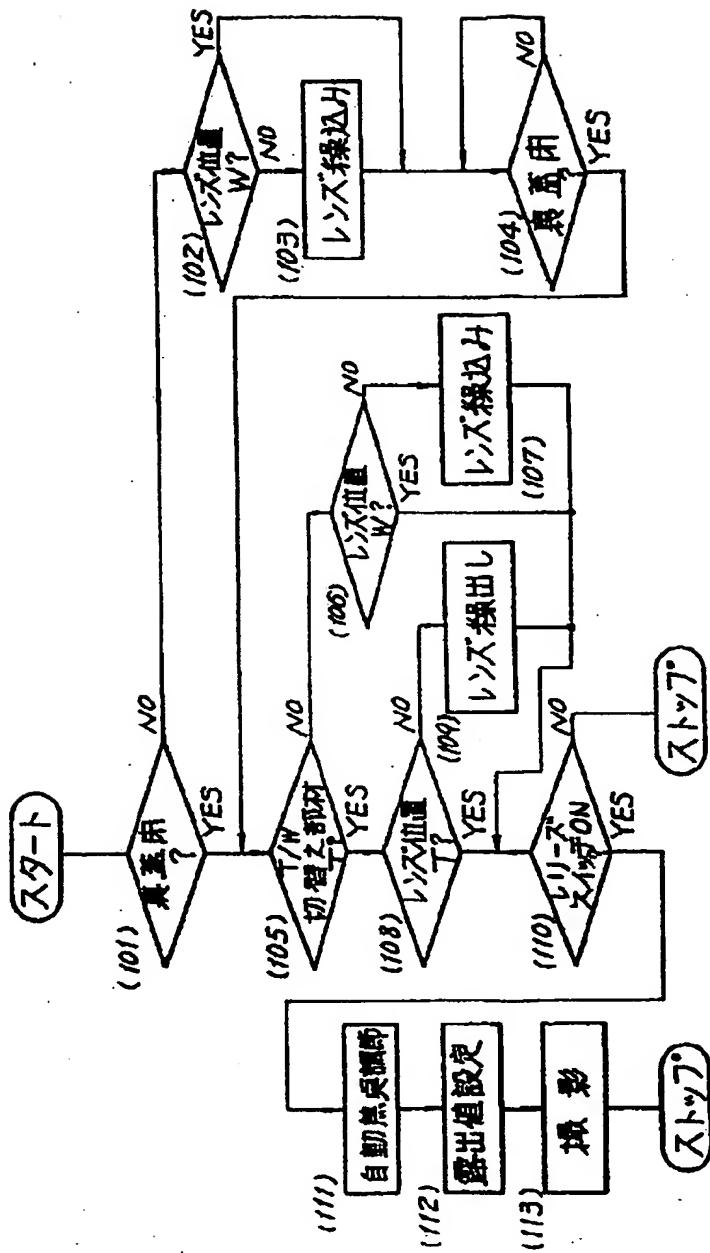
【図3】



【図4】



【図5】



*Date: April 5, 2005*

*Declaration*

*I, Michihiko Matsuba, President of Fukuyama Sangyo Honyaku Center, Ltd., of 16-3,  
2-chome, Nogami-cho, Fukuyama, Japan, do solemnly and sincerely declare that I  
understand well both the Japanese and English languages and that the attached  
document in English is a full and faithful translation of the copy of Japanese  
Unexamined Patent No. Hei-6-308592 laid open on November 4, 1994.*



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*Michihiko Matsuba*

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SAFETY DEVICE OF CAMERA

Japanese Unexamined Patent No. Hei-6-308592

Laid-open on: November 4, 1994

Application No. Hei-6-69306

Filed on: August 29, 1985

Inventor: Hiroshi WAKABAYASHI

Applicant: Nikon Corporation

SPECIFICATION

[TITLE OF THE INVENTION] SAFETY DEVICE OF CAMERA

[ABSTRACT] (Amended)

[Object] The present invention provides a safety device, which prevents the function of a camera from being obstructed by foreign matter entered via film apertures at the time of opening its back cover.

[Construction] The safety device comprises the following: a rear group lens shifting mechanism 16, which enables a rear group lens 2 to retract itself in the direction orthogonal to an optical axis by driving a motor 15; a motor controlling circuit means for controlling the drive of the motor; and a detecting means for detecting displacement of a shifting member displacing itself prior to rewinding, extraction, and loading of a film;

wherein the inventive safety device enables the rear group lens to automatically retract itself to a retracting position of the photographic light path in response to a detection signal from the detecting means as the technical main point of the safety device.

[WHAT IS CLAIMED IS;]

[Claim 1] A safety device of a camera incorporating photographic lenses fitted with a shutter between a front group lens and a rear group lens; wherein said safety device comprising:

a rear group lens shifting means for enabling said rear group lens to shift itself to a retracting position outside the photographic light path via the driving of a motor;

a detecting means for detecting variations of situations occurring prior to rewinding, or extraction, or loading of a film; and

a motor controlling circuit means for controlling the drive of a motor so as to enable said rear group lens to shift itself to said retracting position upon receipt of a detection signal from said detecting means.

[Claim 2] A safety device of a camera according to Claim 1, wherein said photographic lenses comprising: a main lens (1) of said front-group, which is capable of executing a photographic

operation; and an auxiliary lens (2) of said rear-group, which is capable of switching the focal distance from a short-range focal point to a long-range focal point; wherein said main lens (1) and said auxiliary lens (2) are driven by said motor; wherein when said auxiliary lens (2) has shifted itself to said retracting position, said shutter (6) is intruded in the direction approaching a film aperture (17) in conjunction with said main lens (1).

[Claim 3] A safety device of a camera according to Claim 1 or 2, wherein said detecting means comprises a switch ( $SW_1$ ) for detecting opening operation of the back cover (27) of said camera.

[Claim 4] A safety device of a camera incorporating a photographic lens unit fitted with a shutter between a front-group lens and a rear group lens; wherein said safety device comprising:

a rear group lens shifting means for enabling said rear group lens to shift itself from an inserting position inside a photographic light path to a retracting position outside said photographic light path by driving the motor;

an operating means, which outputs a retracting signal whenever an operation is executed so as to position said rear group lens at said retracting position and also outputs an

inserting signal whenever an operation is executed so as to position the rear group lens at the inserting position;

a detecting means, which detects variations of situations occurring in a period from the completion of photographic operations via the whole film up to the opening of the back cover and then outputs a back-cover opening signal;

a position detecting means, which outputs a retracting position signal whenever the rear group lens is present at the retracting position, also outputs a non-retracting position signal whenever the rear group lens is not present at the retracting position, and further outputs an inserting position signal whenever the rear group lens is present at the inserting position, and also outputs a non-inserting position signal whenever the rear group lens is not present at the inserting position;

a motor controlling circuit means, which, upon receipt of at least either of the retracting signal and a back-cover opening signal in conjunction with the non-retracting position signal, controls the drive of the motor so as to shift the rear group lens to the retracting position, and further controls the drive of the motor so as to shift the rear group lens to the inserting position whenever receiving the inserting signal and the non-inserting position signal and whenever failing to

receive the back-cover opening signal;

and a means for disabling a shutter releasing operation, wherein the disabling effect can be realized only after jointly receiving the retracting signal and the retracting position signal or only after jointly receiving the inserting signal and the inserting position signal.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Field of the Art] The present invention relates to a safety device for protecting lenses inside a dark chamber from foreign matter entered via film aperture portions of a camera. In particular, the present invention relates to a safety device of a camera incorporating a photographic lens fitted with a shutter between a front-group lens and a rear group lens.

[0002]

[Prior Art] In terms of a conventional camera incorporating a photographic lens unit fitted with a shutter between a front-group lens and a rear group lens, conventionally, the front surface of the front-group lens is safely protected from being soiled by deposition of dust and other foreign matter by means of a lens barrier or the like. However, as no protecting means has ever been provided for the rear surface of the rear group lens, when the back cover of a camera is opened for loading

a film, the rear surface of the rear group lens is exposed via the film aperture of the camera. Therefore, dust, cutoff, and fragments of film enter into the camera. These impurities easily adhere onto the lens surface and even damage the lenses in an extreme case.

[0003] Not only in the case of a conventional photographic lens unit fitted with a normal between shutter, but the above cases also occur in the case of adding a rear-conversion lens to a photographic lens unit fitted with a behind shutter or also occur in the case of a so-called double-focus type camera enabling a main lens to move forward in conjunction with a shutter before inserting an auxiliary lens. Conventionally, no countermeasure has ever been taken to protect inner devices via the film aperture side.

[0004]

[Problems to be Solved by the Invention] The present invention aims at providing a safety device, which is capable of solving the above-cited defects thus far existing in any of the conventional cameras without causing the proper function of a camera to be obstructed by foreign matter entered via film apertures when the back cover of the camera is open.

[0005]

[Means for Solving the Problems] To achieve the above object,

the present invention provides a rear group lens shifting mechanism for enabling a rear group lens to retract itself in the direction orthogonal to an optical axis by driving a motor; a motor controlling circuit means for controlling the driving of said motor; and a detecting means for detecting displacement of a shifting member displacing itself prior to the rewinding, extraction, or loading of a film, and then, the rear group lens is enabled to automatically retract itself to a predetermined retracting position of a photographic light path by the detection signal detecting means, thus constituting a technical main point.

[0006]

[Embodiment] Next, referring to the accompanying drawings, an embodiment of the present invention is described in detail below. Fig. 1 is a cross-sectional view of a double-focus camera leaving a fragmented portion of the upper surface thereof for explanation of an embodiment of the present invention, and shows the telescopic state that a photographic lens barrel is extruded from a camera body. In Fig. 1, the photographic lens consists of a main lens 1 belonging to the front group, which is capable of photographing by itself across a short focal distance (hereinafter, referred to as a wide angle mode); and an auxiliary lens 2 belonging to the rear group, which is inserted into an

optical axis of the main lens 1 when switching over to a long focal distance mode (hereinafter, referred to as a telescopic mode). A main lens frame 3 for securing the main lens 1 is fixed to a shutter base plate 5 secured to a base plate 4. A shutter unit 6 concurrently with a diaphragm is disposed between the base plate 4 and the shutter base plate 5. A lens barrier device 7 is disposed in front of the main lens 1. A photographic lens barrel 8 is secured to the front side of the base plate 4 by means of covering the external periphery of the main lens frame 3, the shutter base plate 5, and the lens barrier device 7.

[0007] On the back side of base plate 4, an auxiliary lens frame 9 for retaining the auxiliary lens 2 is rotatably held at the periphery of a supporting shaft 10. Further, as shown in Fig. 2, a driving motor 15 is fixed so as to cause a gear 12 integrated with a feed nut 12 engaged with a feed screw shaft 11 extended in the optical axis direction to be rotated via a bevel gear 14, thereby arrangement is made so that the base plate 4 can be shifted by rotation of the driving motor along the optical axis. Further, the above auxiliary lens frame 9 is driven by the driving motor 15 via an array of reduction gears 16. And, when the photographic lens barrel 8 has been set to a wide angle position shown in Fig. 3 from a telescopic

position shown in Fig. 1 in conjunction with the base plate 4, the auxiliary lens frame 9 is shifted to a retracting position shown via a broken line outside the photographic light path from an inserting position shown in Fig. 2, in which the auxiliary lens frame 9 coincides with the auxiliary lens 2 with the optical axis of the main lens 1 by a solid line.

[0008] A projected wall 21 accommodating the movable base plate 4 and the photographic lens barrel 8 is disposed in front of a camera main body 20 integrally having a film aperture 17, a film loading chamber 18, and a film rewinding chamber 19. The camera main body 20 and the projected wall 21 are covered with an external cover 22. Further, as shown in Fig. 1, a focal distance switching operation member 23 and a shutter release button 24 are disposed on the upper surface of the external cover 22. Between the camera main body 20 and the base plate 4, electrical devices including the driving motor 15 and a shutter controlling unit 25 are respectively disposed on the base plate 4 and a flexible circuit board 26 for electrically connecting the electrical devices of the camera side for controlling these. Further, a projected member 28 is disposed on the inner surface of the back cover 27 of the camera so as to open and close a back cover switch SW<sub>1</sub> set to the camera main body 20. The back cover switch SW<sub>1</sub> constitutes a detecting

means for detecting whether the back cover 27 is at the open position or at the closed position. Further, another projected wall 29 is disposed at the periphery of the front side of the film aperture 17 of the camera main body 20. It is arranged so that the base plate 4 can be intruded up to a position close to the front edge 29a of the projected wall 29 at the wide angle position. Accordingly, the auxiliary lens 2, an array of reduction gears 16, and the driving motor 15, respectively set to the back-side surface of the base plate 4 are no longer visible via the film aperture 17. Further, the above mechanism prevents dust and impurities from entering the inner parts causing the auxiliary lens 2 to be clouded or causing its operation with the gear array 16 to be obstructed. In particular, as the auxiliary lens 2 retracts itself from the front side of the film aperture 17, there is no fear that the auxiliary lens 2 incurs damage by foreign matter entered via the film aperture, thus making it possible to secure safety.

[0009] The rear surface of the main lens 1 belonging to the front group is covered with the shutter 6, therefore, there is no fear of causing dust or foreign matter to adhere onto the rear surface of the main lens 1, thus providing safety protection. Fig. 4 exemplifies a schematic block diagram of a circuit for controlling the driving motor 15 of the camera

according to an embodiment shown in Fig. 1. Although not shown in Fig. 1, the camera is provided with an object luminance detecting device 40 and an automatic distance detecting device 50. A shutter controlling device 23 for controlling the driving of the shutter 6 concurrently with a diaphragm and a motor controlling circuit 60 for controlling rotation of the drive motor 15 are respectively arranged to operate themselves in conformity with instructions of a microprocessor (CPU) 30 that actuates own operation in response to the actuation of a power supply switch SW<sub>0</sub> in conjunction with operations of the object luminance detecting device 40 and the automatic distance detecting device 50. When the shutter release button 24 shown in Fig. 1 is depressed by half depth, a shutter-release switch SW<sub>3</sub> is closed so as to transmit the existing release data to the CPU 30. In response, by actuating operation of the automatic distance detecting device, the CPU 30 detects actual distance from an object, and then, based on the detection signal, the CPU 30 actuates the driving motor via the motor controlling circuit 60, then, adjusts the distance by shifting the base plate 4 in response to the distance from the object. Simultaneously, based on the detection signal from the object luminance detecting device 40 that receives light reflected from the object, the CPU 30 calculates a proper stop (F) value

and a proper shutter speed value, and then stores these calculated values in the memory. Next, simultaneous with a full depression of the shutter release button 24, the shutter 6 is released. In response, the shutter controlling device 23 causes the CPU 30 to open and close the shutter 6 in accordance with the combination of the stop (F) value and the shutter speed value stored in the memory, thus terminating an exposure. After terminating the exposure, in conformity with a predetermined sequence, the CPU 30 transmits a controlling signal to the motor controlling circuit 60, thereby reversing the rotation of the driving motor 15 so as to enable the photographic lens barrel 8 to return to the reset position in conjunction with the base plate 4. When the photographic lens barrel 8 has returned to the reset position, the CPU 30 receives a reset data from a reset switch SW<sub>5</sub> linked with a reset base plate 4, and then causes the driving motor 15 to stop own rotation.

[0010] On the other hand, when the symbol "T" of the focal distance switching operation member 23 shown in Fig. 1 has been switched over to "W," based on the switching data from a T/W switching switch SW<sub>2</sub> linked with the focal distance switching operation member 23, as shown in Fig. 3, the CPU drives the rotation of the driving motor 15 so as to cause the photographic lens barrel 8 to be intruded from a telescopic position to a

wide angle position in conjunction with the base plate 4. Simultaneously, as shown in Fig. 3, the auxiliary lens frame 9 shifts itself from the inserting position shown in Fig. 1 to a retracting position further outside than the projected wall 29 disposed in front of the film aperture 17, thereby enabling only the main lens 1 to be subject to a switching over to a short-focus lens among photographing lens. Next, when the base plate 4 has shifted itself from the telescopic position to a wide angle position, in linkage with movement of the base plate 4, the CPU 30 receives positional information from a lens position detecting switch SW<sub>4</sub> of a lens position detecting device such as an encoder (not shown), which detects whether the photographic lens barrel 8 accommodating photographing lens unit is presently disposed at the telescopic position or at the wide angle position.

[0011] Fig. 5 is a flowchart for controlling lens arrangement executed by the CPU 30. In response to signals switching between the back cover switch SW<sub>1</sub>, the T/W mode switching switch SW<sub>2</sub>, or the shutter release switch SW<sub>3</sub>, the CPU 30 actuates own operation. First, the CPU 30 judges whether the back cover 27 is closed or not (step 101). This judgment is executed based on the back cover opening and closing information from the back cover switch SW<sub>1</sub>. If the judged result were NO in step 101,

in other words, when the back cover 27 remains open, the CPU 30 judges whether the lens position is disposed at the wide angle side reset position together with the base plate 4 or not (step 102). In this case, the lens positional information is judged based on the information from the T/W position detecting switch SW<sub>4</sub> and the reset switch SW<sub>5</sub> linked with the base plate 4. If the lenses were not disposed at the wide angle side reset position, in other words, if the judged result were NO in step 102, the lenses are intruded together with the base plate 4 (step 103). When the lenses have arrived at the wide angle side reset position, standby mode remains until the back cover 27 is closed (step 105). If the judgment in step 102 were YES, in other words, even when the lenses are disposed at the wide angle side set position, standby mode still remains until the back cover 27 is closed (step 104).

[0012] If the CPU 30 judges in step 101 or step 104 that the back cover 27 is closed, in other words, if the judged result were YES, based on the information from the T/W switching switch SW<sub>2</sub> linked with the focal distance switching operation member 23, then, the CPU 30 judges whether the telescopic mode (T) has been selected or not (step 105). If the judged result were NO, in other words, when the wide angle mode (W) has been selected, based on the information from the lens position detecting switch

$SW_2$ , the CPU 30 judges whether the lenses are actually disposed at the wide angle side reset position or not (step 106). If the judged result were YES, in other words, when the lenses are disposed at the wide angle side reset position, operating mode shifts to step 110. If the lenses were disposed at the telescopic position, the lenses are intruded (step 107). When the lenses have just arrived at the reset position, operating mode shifts to step 110.

[0013] On the other hand, if the judged result were YES in step 105, in other words, when the T/W switching member 23 has been set to the telescopic position (T), based on the information from the lens position detecting switch  $SW_2$ , the CPU 30 judges whether the lenses have been disposed at the telescopic mode reset position or not (step 108). If the judged result were NO, in other words, when the lenses have been disposed at the wide angle side reset position, the lenses are extruded forward (step 109). When the lenses have just arrived at the telescopic reset position, operating mode proceeds to the next step 110.

[0014] If the judged result were YES in step 108, in other words, when the CPU 30 judges that the lenses are disposed at the telescopic mode reset position, it is judged whether the shutter release switch  $SW_3$  linked with the shutter release button 24 has been turned ON or not (step 110). When the shutter release

switch SW<sub>3</sub> has been turned ON, based on the detection signal from the automatic distance detecting device 50, the CPU 30 executes an automatic focus adjusting operation (step 111). Further, based on the detection signal from the luminance detecting device (40) that receives light reflected from an object, the CPU 30 calculates a proper stop (F) value and a proper shutter speed value, and then automatically sets a proper exposure value (step 112). Next, in accordance with the continued sequence, the CPU 30 executes an operation for implementing a shooting (step 116). After completing the required shooting, in response to the shooting completed signal, the CPU 30 stops its own operation.

[0015] In the above embodiment, it is arranged so that, based on the information from the back cover switch SW<sub>1</sub> that detects movement of the back cover being opened prior to the changing or loading of a film, the main lens 1 and the auxiliary lens 2 are respectively subject to a shifting movement. However, the method of driving the main lens 1 and the auxiliary lens 2 is not solely based on the information from various switches directly linked with the opening and closing of the back cover. For example, it is provided that the switching means for detecting the movement of the displaceable member prior to rewinding of the film, for example, the switch for detecting

the tensile force variation of the film in the case of the press operation of the rewinding button and the termination of the film winding, and the switch being linked with the displaceable member prior to extraction or loading of the film, for example, the sliding movement of the rewinding knob that releases a union between a film cartridge shaft and a rewinding shaft in the axial direction, and therefore, it may be arranged that the auxiliary lens is automatically sheltered, and simultaneously the main lens is inserted into the submerging position by the signal from the switch.

[0016] In the above embodiment, it is arranged so that the automatic retracting of the auxiliary lens is released by closing operation of the back cover. However, it is alternatively practicable to have the auxiliary lens released from the automatic retracting position in response to a detection signal from a switch detecting locking operation executed by the back cover locking device, rapid winding of a film without shooting operation, and also detecting depressing operation against the rapid winding button. Note that the above embodiment is based on the arrangement by causing the auxiliary lens 2 to be driven in conjunction with the main lens via an identical motor in the double focus type camera. In the case of such a camera provided with a photographing lens providing a shutter between

the front group lens and the rear group lens, it is also practicable to cause only the rear groups to retract itself.

[0017]

[Effects of the Invention] As described above, according to the present invention, at least when the back cover remains open, the auxiliary lens (rear group lens) retracts itself from the front surface of the film aperture, whereas the back surface of the main lens (front group lens) is covered by the shutter. Accordingly, it is possible to safely protect photographing lenses from being soiled by dust and other foreign matter entered via film apertures. Further, as shown in the above embodiment, when applying the inventive safety device to a double focus type camera, simultaneously with a retracting movement of the rear group lens, the lens shifting mechanism approaches the outside portion of the film aperture in conjunction with the front group lens to cause the front surface of the film aperture to be covered by the shutter portion, and thus, there is no fear of causing dust and foreign matter entered via the film aperture to directly adhere to the lens shifting mechanism. Accordingly, it is possible to eliminate the causes of generating malfunction or failure in the operation of the lens shifting mechanism.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1] is a cross-sectional view of a double-focus type camera showing an embodiment of the present invention;

[Fig. 2] is a perspective view of the lens driving mechanism according to the embodiment shown in Fig. 1;

[Fig. 3] is a cross-sectional view for demonstrating the condition when the back cover of the camera according to the embodiment shown in Fig. 1 remains open;

[Fig. 4] is a controlling circuit diagram for controlling operation of the camera shown in Fig. 1; and

[Fig. 5] is a flowchart for explanation of the controlling operation of the microprocessor (CPU) shown in Fig. 4.

[Description of Symbols of Main Components]

1: Main lens (front group lens)

2: Auxiliary lens (rear group lens)

3: Main lens frame

4: Base plate

6: Shutter

8: Mirror cylinder incorporating photographing lenses

11 to 13: Base plate shifting mechanism

15: Motor

16: Array of reduction gears

(Rear group lens shifting mechanism)

23: Focal distance switching operation member

27: Back cover (Displaceable member)

30, 60: Motor controlling circuit means

SW<sub>1</sub>: Back cover switch (Detecting means)

**Fig. 4**

- 25: Shutter controlling device**
- 40: Luminance detecting device**
- 50: Automatic distance detecting device**
- 60: Motor controlling circuit**

**Fig. 5**

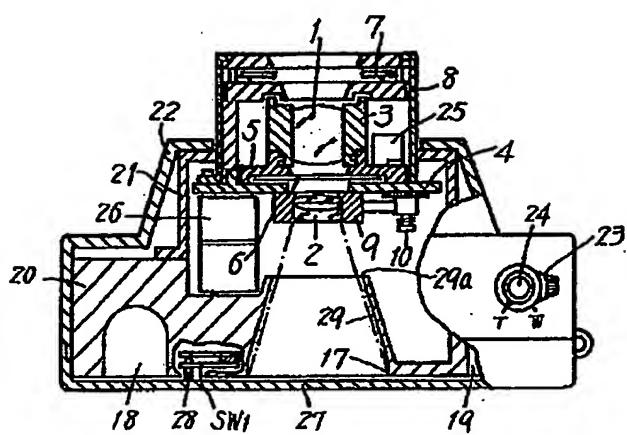
**START**

- 101: Back cover closed?**
- 102: Lens position at W?**
- 103: Intrudes the lens**
- 104: Back cover closed?**
- 105: T/W switching member at T mode?**
- 106: Lens position at W?**
- 107: Intrudes the lens**
- 108: Lens position at T?**
- 109: Extrudes the lens**
- 110: Release switch ON?**
- 111: Adjusts AUTO focus**
- 112: Sets an exposure value**
- 113: Shooting**

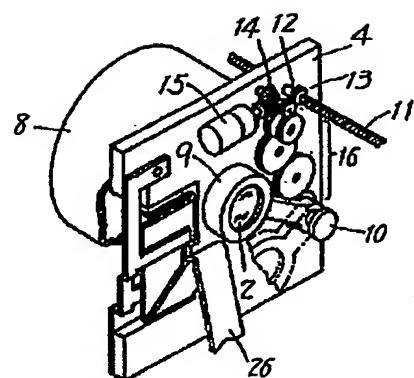
**STOP**

**STOP**

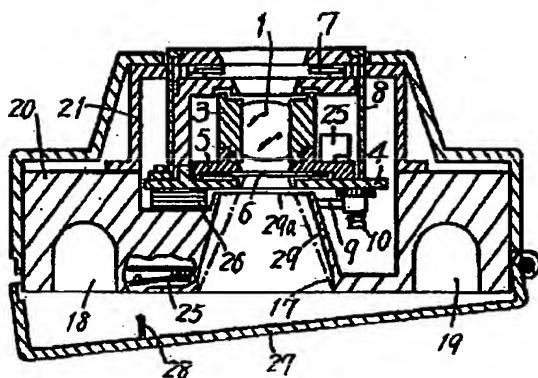
**Fig.1**



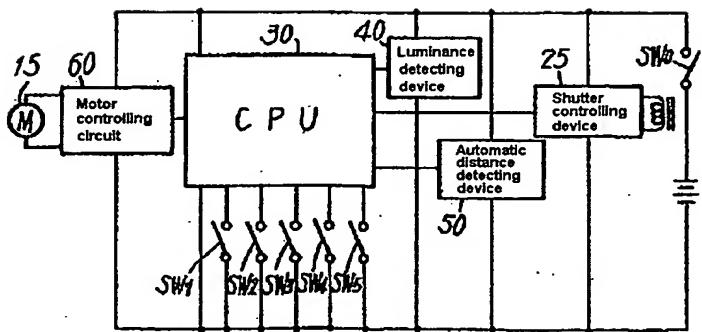
**Fig.2**



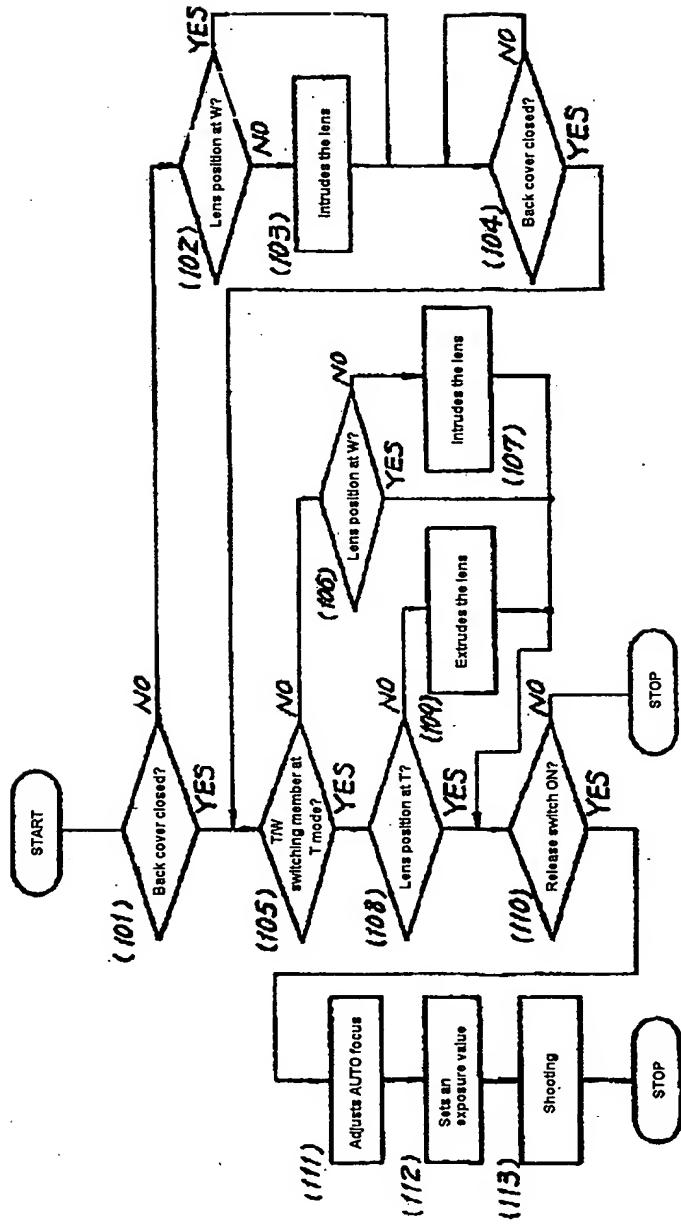
**Fig.3**



**Fig.4**



**Fig.5**



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